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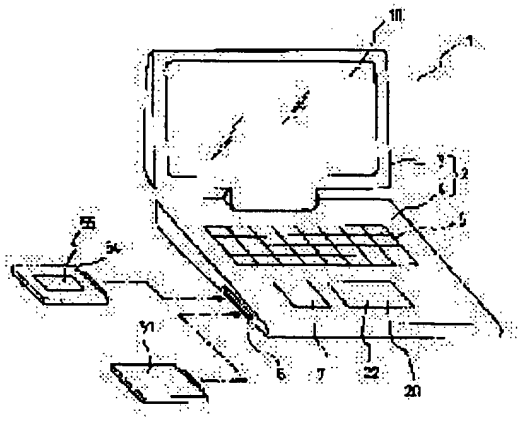
(54) INFORMATION PROCESSING DEVICE AND METHOD

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a portable information processor such as a notebook type personal computer, etc., that can be used more easily and also can continuously operate a pager function, etc., for 24 hours.

SOLUTION: A small sub-LCD 20 of low resolution is prepared in addition to a large main LCD 10 of high resolution, and the sub-LCD 20 can always be viewed even when the main LCD 10 is closed. A touch panel 22 is provided at an upper part of the sub-LCD 20, and both sub-LCD 20 and panel 22 can be used as the pointing devices and also used for the pen input operations. Furthermore, the sub-LCD 20 and a sub-CPU which controls the sub-LCD 20 can receive and display the pager messages even when the main LCD 10 and a main CPU which controls the LCD 10 atop their operations.



LEGAL STATUS

[Date of request for examination] 15.11.2001

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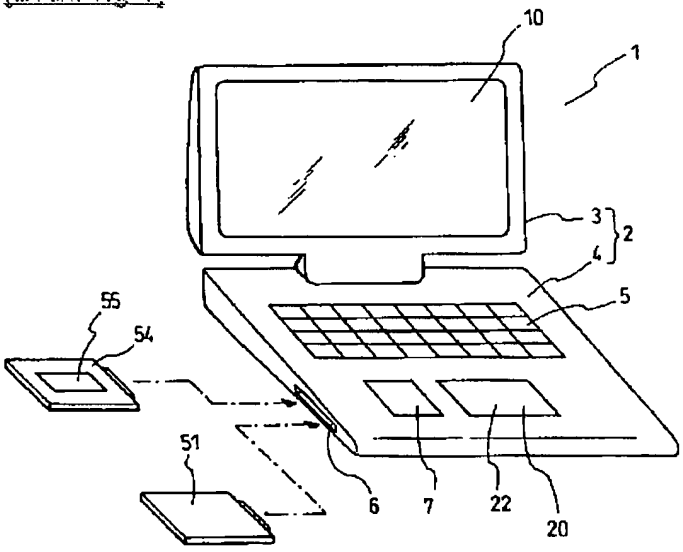
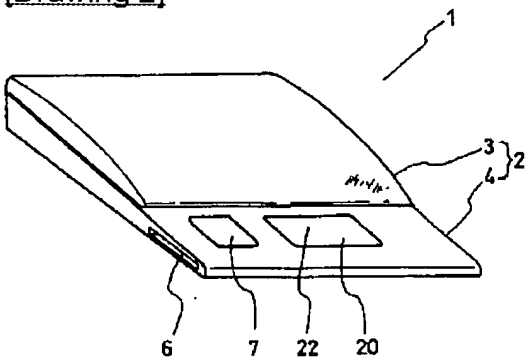
DRAWINGS

[Drawing 1]

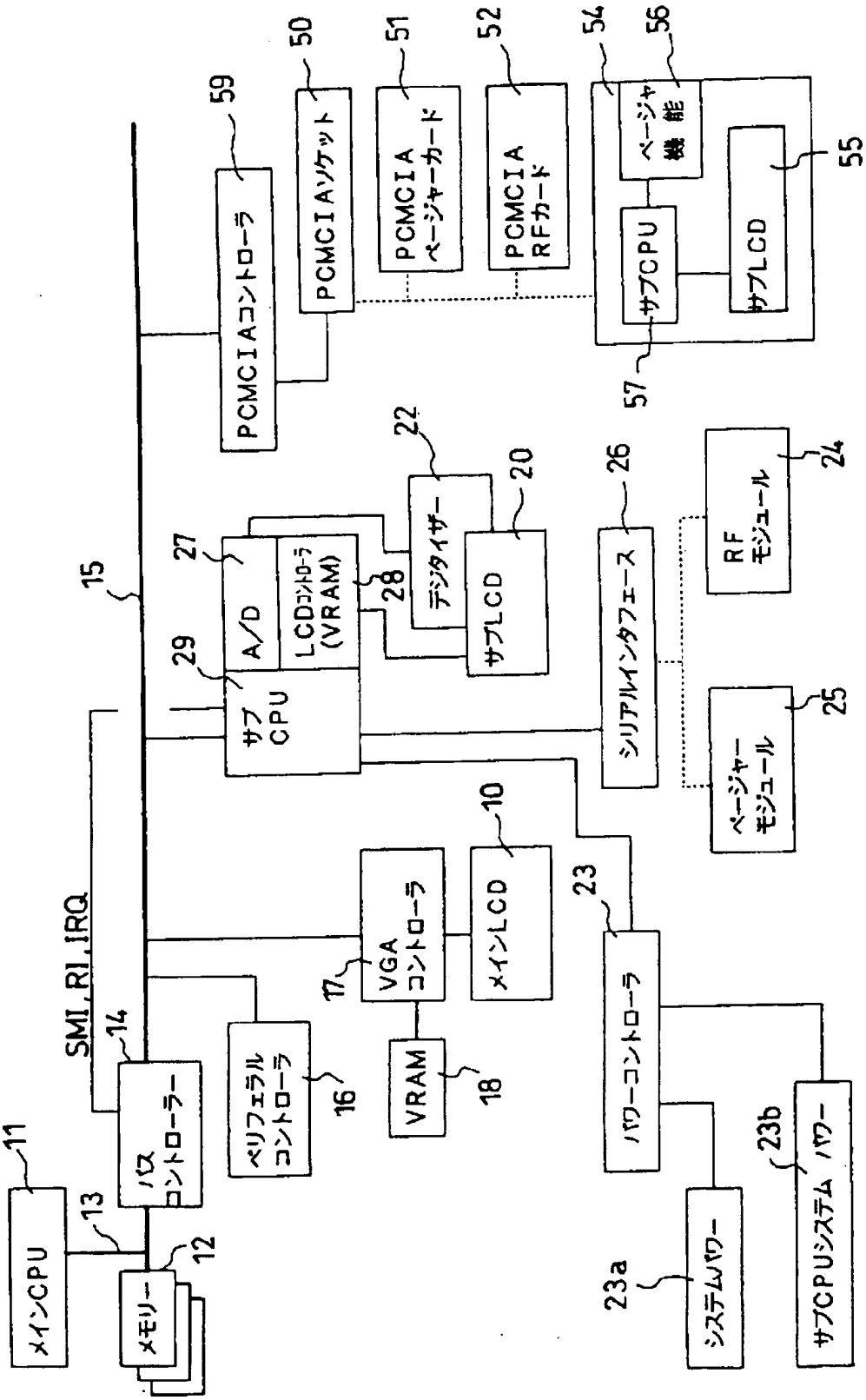


[Drawing 2]



[Drawing 3]

h g cg b eb cg e e



[Drawing 4]

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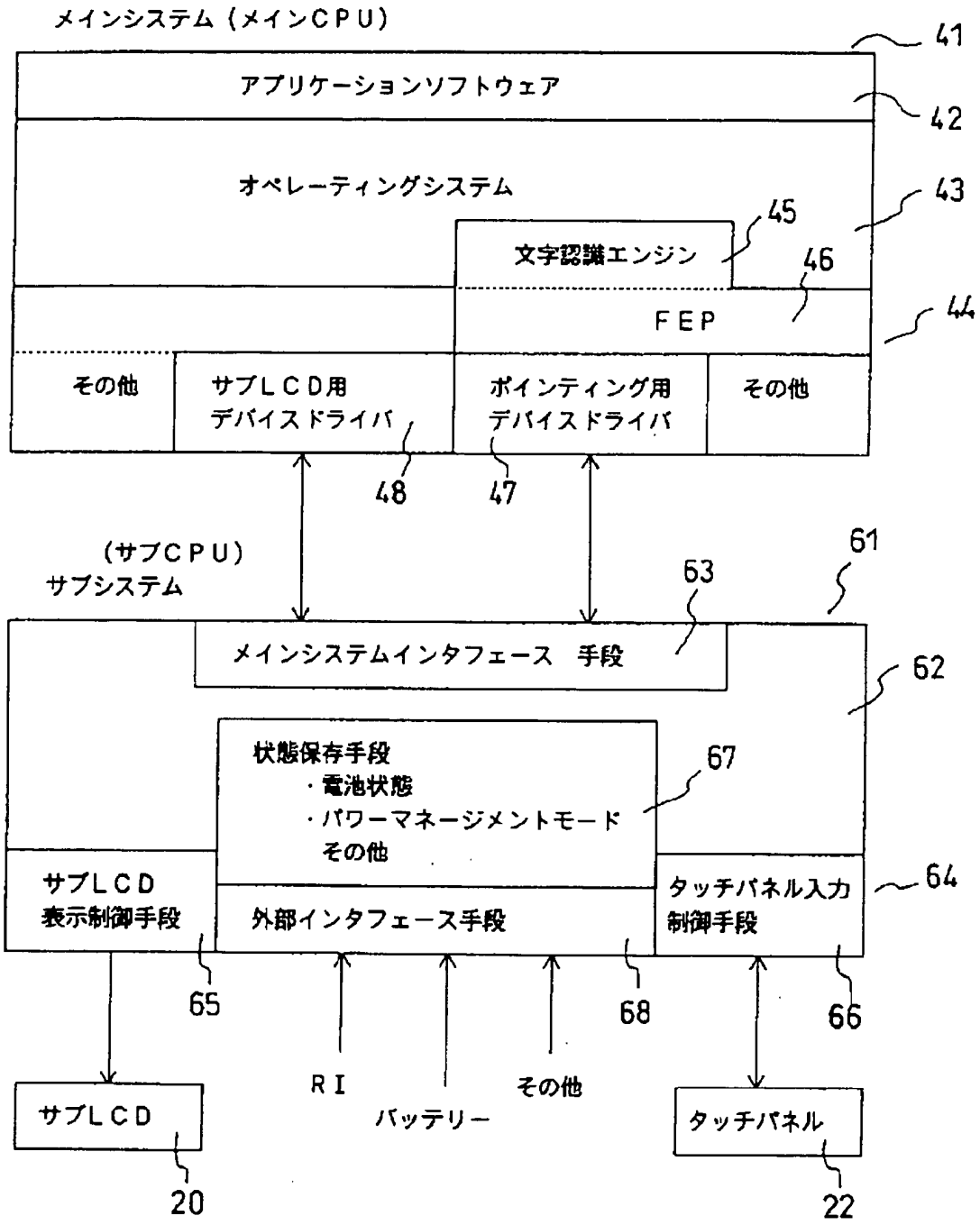
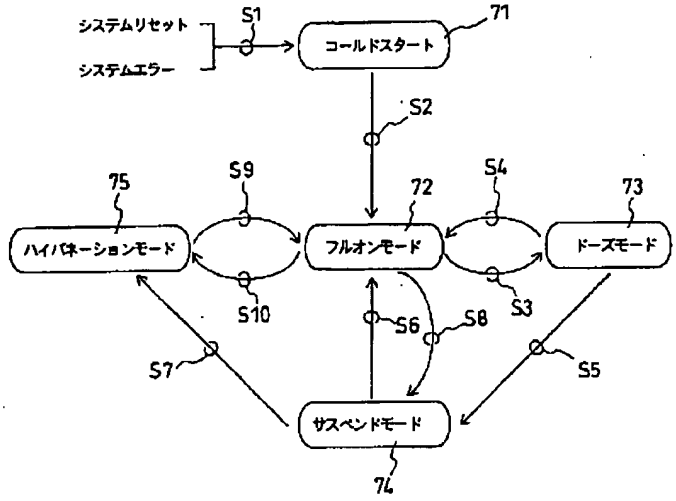
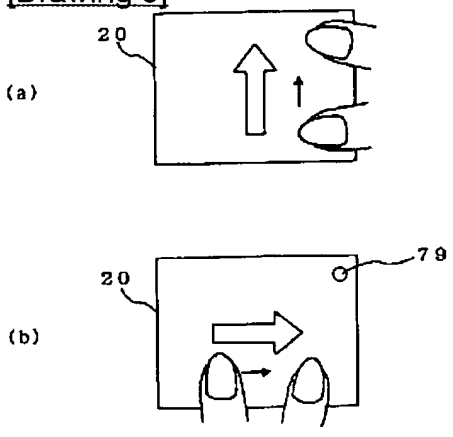

メインシステム（メインCPU）
41
アプリケーションソフトウェア
42
オペレーティングシステム
43
45
文字認識エンジン
46
FEP
44
その他
サブLCD用
デバイスドライバ
ポインティング用
デバイスドライバ
その他
48
47
（サブCPU）
サブシステム
61
63
メインシステムインタフェース 手段
62
状態保存手段
・電池状態
・パワーマネージメントモード
その他
67
サブLCD
表示制御手段
外部インタフェース手段
タッチパネル入力
制御手段
64
65
68
66
RI
バッテリー
その他
サブLCD
タッチパネル
20
22

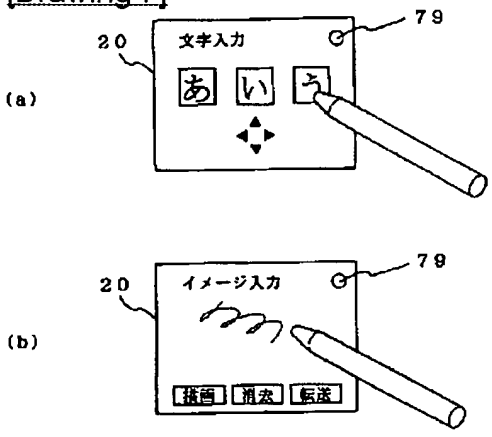
[Drawing 5]



[Drawing 6]



[Drawing 7]



[Drawing 8]

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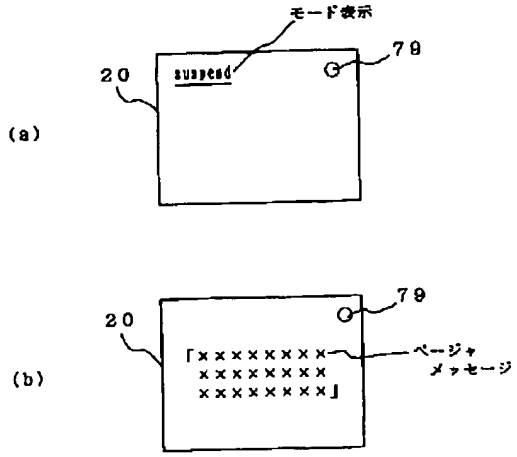
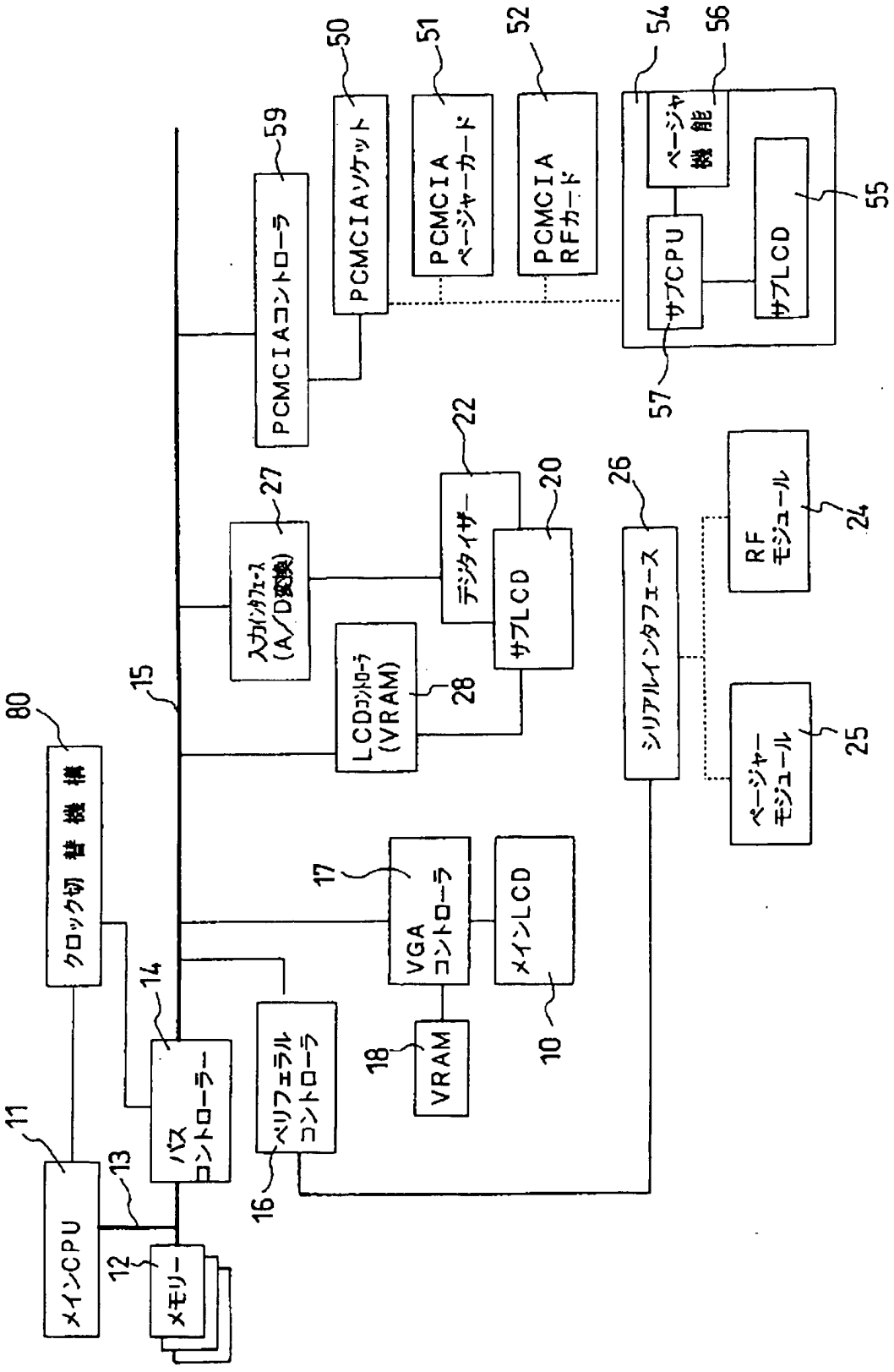


[Drawing 9]

h g cg b eb cg e e



[Translation done.]

h g cg b eb cg e e

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] About information processors, such as a personal computer (personal computer), in the personal computer of the miniaturized pocket mold, it is further easy to use especially this invention, and it makes multi-functionalization possible.
[0002]
[Description of the Prior Art] The personal computer of a notebook mold appears in a commercial scene, and the miniaturization of an information processor and lightweight-ization are progressing. Moreover, many the user-friendly operating systems (OS) and applications using a pointer are developed, and advanced features of a personal computer are also progressing. For this reason, since it corresponds to a miniaturization and advanced features, many devices are given to an input unit, a power unit, etc. of a personal computer. For example, what was equipped with pointing devices, such as a trackball and a slider, together with the keyboard is marketed so that user-friendly OS and the application using a pointer can be used with the personal computer of a notebook mold, and even if it does not carry out external [of the mouse], the above-mentioned software can be used.
[0003] Moreover, in order to make processing speed quick, high-speed CPU is carried also in the personal computer of a pocket mold, or big LCD of a display rectangle is carried in it with high resolution, and power consumption is increasing in connection with this. For this reason, when there is no fixed time amount access, there is a personal computer which performs resume processing etc. and is made to suspend a system. Moreover, to CPU which can operate with the clock of two or more frequencies, when there is no fixed time amount access, there is also a personal computer which supplied the clock with a low frequency.
[0004]
[Problem(s) to be Solved by the Invention] Thus, it miniaturized and the invention-in-this-application person aimed at offering the personal computer which it is more user-friendly and is easy to use to the personal computer of the pocket mold which is having advanced features. Moreover, it also made into the purpose at coincidence to offer the personal computer which the time amount continued and used is prolonged also although it is called the personal computer of a pocket mold corresponding to the information society of these days, and matches such a use gestalt, and can lengthen the life of a power source at that time. Furthermore, it is also one of the purposes to offer the personal computer which can incorporate further the functions in which spread will be expected from now on, such as an individual selection call function (pager function). Of course, if it is a pocket mold at all, it is also one of the purposes to consider as the personal computer with which can be satisfied of a demand called a miniaturization, lightweight-izing, and low-pricing.
[0005]
[Means for Solving the Problem] In addition to the Maine display with which the conventional

personal computer is equipped, the invention-in-this-application person proposed the gestalt of the new personal computer of preparing it, an EQC, or a small subdisplay, to these purposes. That is, information processors, such as a personal computer in this invention, have a main processor, and the Maine display and subdisplay connected through the bus to this main processor, and it is characterized by a subdisplay having the Maine display, an EQC or the 1st mode in which it is small and the Maine display and the subdisplay are operating further, and the 2nd mode in which only the subdisplay is operating.

[0006] Many merits can be found out by preparing the Maine display and a subdisplay. For example, in the field of a display and input of data, if viewing areas which operate on the Maine display, such as a pop up menu of application, are assigned to a subdisplay side, menu selection etc. can be processed, without lacking some images by the side of the Maine display. Moreover, OS also enables it to assign commands, such as an error message, to a subdisplay side.

[0007] It becomes possible [performing various processings] by preparing a subdisplay in addition to the Maine display, and preparing a touch panel in this subdisplay in piles further to choose from on a subdisplay processing by which it was indicated by the menu etc., without reducing the display function of the Maine display. A touch panel may be the transparence or the translucent thing to install on a subdisplay, or may be installed in the bottom of a subdisplay like an electromagnetic-induction type. Moreover, at least, the field of the cursor displayed on the Maine panel by the at least 1 section of a touch panel and a pointer which inputs the motion of either, for example, relative movement magnitude and a relative direction, can also be set up, and using as a pointing device also becomes possible. The field which performs a pen input may be set as the application currently shown on the Maine display by the at least 1 section of a touch panel. It is not necessary to give two functions, a display and an input, to the Maine display side by preparing such an input area on a subdisplay. For example, speaking of a pen input, as well as a screen becoming legible, since a touch panel becomes unnecessary at the Maine display side, factors by the touch panel, such as a fall of contrast and a cost rise, can be eliminated. Moreover, since a subdisplay may be smaller than the Maine display, a touch panel with more high resolving power can be prepared. Therefore, it is also easy to be able to give the function as a highly precise pointing device, and the function as a pen input, and to switch the input approach with an actuation scene, application, etc.

[0008] On the other hand, as a function of an information processor, it is large-sized and there are also many functions which do not need the Maine display of high resolution. For example, the display of time of day or a schedule, the call display of a pager, reception of e-mail, the function as a calculator, etc. are mentioned. As for these functions and displays, it is desirable to continue for 24 hours and to operate. However, there are limits, such as power consumption and a life of a display, and they were not able to display continuously. On the other hand, a subdisplay can be worked in the condition with little [it is possible to display these functions on a subdisplay in the information processor of this invention for 24 hours, and] power consumed. Therefore, service continued for 24 hours, without applying a big burden to a power source can be offered.

[0009] Thus, it is possible to perform activation of the software processed on control of a subdisplay and a subdisplay by the low subprocessor of a different throughput from a main processor. Therefore, the 2nd mode in which only a subprocessor operates can be formed to the 1st mode in which a main processor and a subprocessor operate. Furthermore, since it is made to pay a part of processing of a main processor in the 1st mode by the subprocessor, improvement in processing speed is expectable. On the other hand, although an information processor is continued and it is moving in the 2nd mode, since only a subprocessor operates, power consumption can be reduced sharply. It is also possible to perform the shift to the 1st mode from the 2nd mode by actuation on a sub panel. Control which shifts to the 2nd mode in

which a subdisplay operates, from the 1st mode in which the Maine display and a subdisplay operate by the actuation on a sub panel, the existence of access, etc., and shifts to the 1st mode from the 2nd mode can be performed.
[0010] Instead of preparing a subprocessor, the main processor which can be changed into at least two steps is adopted for the frequency of a clock of operation, in the 1st mode, a main processor can be moved with the clock of a high frequency of operation, and a main processor can be moved with the clock of a low frequency of operation in the 2nd mode.
[0011] The above effectiveness by preparing a subdisplay is acquired also in information processors, such as not only portable information processors, such as a personal computer of a notebook mold, but a desktop mold.
[0012] In portable information processors, such as a notebook mold, although a main processor, the Maine display, and a subdisplay are contained by the body, in that case, the Maine display is contained on a body so that it may expose if needed, and, as for a subdisplay, it is desirable to contain on a body so that it may always expose. Since it can continue for 24 hours and the function mentioned above by preparing a subdisplay can be displayed, it is effective to change a subdisplay into the condition that it can always see. The subdisplay is possible also for providing as an option, and it is desirable in such equipment to prepare the slot equipped with the module carrying a subdisplay and the display window a subdisplay appears from the outside whenever it is equipped with this module.
[0013]
[Example] Based on the portable notebook sized personal computer which is the example of this invention, this invention is explained in more detail below.
[0014] Signs that opened the body 2 of the notebook sized personal computer 1 of this example to <outline of equipment> drawing 1 , and Maine LCD was exposed to it are shown. Moreover, signs that closed the body 2 to drawing 2 and Maine LCD was kept in it are shown. The part 3 in which the high resolution LCD panel 10 which is the display of Maine was carried is attached possible [revolution] to the part 4 carried [keyboard / 5], and the personal computer 1 of this example makes it the small configuration convenient to carry as a condition which closed the LCD panel 10 as shown in drawing 2 at the time of carrying. The LCD panel 10 and a keyboard are mutually covered by coincidence, and are protected to an operation mistake or breakage. When operating a personal computer 1 using the LCD panel 10, as shown in drawing 1 , the LCD panel 10 is opened, the LCD panel 10 and a keyboard 5 are exposed, and the environment which is easy to operate it is made.
[0015] As for the personal computer 1 of this example, the small subdisplay 20 is further prepared before the keyboard 5. This subdisplay 20 is the LCD panel of about 1/10 area of the Maine display 10, and is good in this example at the monochrome display of a low resolution. It is mostly equipped in the center and the subdisplay 20 will be in the condition at the tip of the part in which the keyboard 5 was carried of having exposed even if it closed the LCD panel 10 of Maine, as shown in drawing 2 . Therefore, even if it is at the pocket time, the subdisplay 20 always appears in a table, and even if it does not open and close the body 2 of a personal computer 1, the contents of a display of the subdisplay 20 can be seen. Moreover, the front face of this subdisplay 20 is equipped with the almost transparent touch panel (digitizer) 22, and actuation of a pointer or cursor is performed from on the subdisplay 20, or it has come to be able to perform a pen input so that it may mention later. A touch panel is not limited to transparence or a translucent thing like this example, but if it is the thing of a non-contact mold like an electromagnetic-induction type, it can be prepared in the bottom of a subdisplay.
[0016] In addition to connectors (un-illustrating), such as a power source and a printer, the slit 6 for PCMCIA card installation to which a PCMCIA socket is located in the interior is formed in the side face of the personal computer 1 of this example. Therefore, it is possible to insert various kinds of cards corresponding to PCMCIA of this slit, and to diversify the function of a

personal computer 1. For example, it is also possible to insert the card 51 with an individual selection call function (pager function), to receive the call using wireless, and to receive a message. Moreover, it is also possible to equip with the card 54 with which the subdisplay 55 was carried. Equipping with the card with which such a subdisplay was carried in the body 4 of the personal computer of this example is also taken into consideration, and according to the magnitude of a subdisplay, it can remove now near [7] the slit 6 so that the subdisplay carried in the card may appear. If it equips with the card 54 with which the subdisplay was carried, the subdisplay 20 and two in all subdisplaying the personal computer of this example will become usable. [with which the body 2 is equipped beforehand]

[0017] The system configuration of the outline of the personal computer of this example is shown in <system configuration> drawing 3 . The personal computer 1 of this example is equipped with the bus and bus controller 14 which connect memory 12 called Maine CPU11, ROM, and RAM, and various modules and CPUs11 of high performance, such as 32 bits which operates at high speeds, such as 100 etc.MHz, or 64 bits. Maine CPU 11, memory 12, and a bus controller 14 are connected by the local bus 13, and a bus controller 14 controls I/O of the data to various kinds of modules through ISA Bus 15. Moreover, in addition to control of a bus, the bus controller 14 of this example interrupts, and also performs control of a resource. Therefore, the signal which controls the condition of systems for power managements, such as SMI (system management interrupt), RI (ring indicator), and IRQ (interrupt request), among the factices CPU who mention later is transmitted and received, the operating state of Maine CPU 11 is controlled, or the condition of the video controller for the Maine display etc. is also controlled corresponding to this.

[0018] Various modules are connected to ISA Bus 15, for example, the PCMCIA controller 59 which controls the exchange with a card with each function connected through the peripheral controller 16 which controls the main I/O, the factice CPU 29 who controls subdisplay relation, and the PCMCIA socket 50 is connected to drawing 3 . The peripheral controller 16 achieved functions, such as a serial port controller, a parallel port controller, a FDD (floppy disk) controller, and a controller for DMA interfaces, and is further equipped with the function as RTC (real time clock).

[0019] A video controller 17 controls Maine LCD 10 with Video RAM 18 connected with this, and supports LCD, such as VGA, SVGA, monochrome, or a color. High efficiency and a mass thing are adopted also as the video controller 17 and VRAM18 so that many colors LCD of the high resolution corresponding to the application with which Maine LCD 10 was color-display-ized [colors / recent years, / 256] may be adopted and can respond to this.

[0020] The PCMCIA socket 50 is equipped and there is a pager card 51, for example as a card connected to ISA Bus 15 through the PCMCIA controller 59. Although there are some classes of the pager cards 51 by a communication mode etc., by the wireless of a specific frequency band, a call is performed to a specific user and a message etc. can be transmitted to coincidence. There is also a thing equipped with functions, like in addition to it, the pager card 51 is used and proofreading of time of day can be performed. Other RF cards 52 using wireless, for example, a PHS card, a GPS card, etc. can be carried in the PCMCIA socket 50, and can add the function of each card to a personal computer. Furthermore, the card 54 having the small sub LCD panel 55 can also be carried in a socket 50. The pager function 56 is carried in drawing 3 , and PCMCIA card 54 which contained the processor 57 which controls the factice LCD 55 of this pager function and built-in is indicated as an example to it. Of course, it is possible to carry other various PCMCIA cards for utilities, such as not the thing limited to this example but a game and count.

[0021] The factice CPU 29 who controls a factice LCD 20 is further connected to ISA Bus 15, and a factice LCD 20 is controlled by sub CPU29 independent one, or it has come to be able to perform control of the application which operates using a factice LCD 20 in harmony with

Maine CPU 11. The LCD controller 28 for controlling a factice LCD 20 directly is connected to the factice CPU 29, and the LCD controller 28 equips him with VRAM of a suitable capacity. Furthermore, the A/D (analog-to-digital) conversion module 27 which can change the data from the digitizer 22 installed on the factice LCD 20 is also connected to the factice CPU 29. Moreover, in the personal computer of this example, the serial interface 26 soon connected with the factice CPU 29 is also established, and this serial interface can be equipped with the pager module 25 or other RF modules 24. Therefore, it is also possible to be able to use serial interface 26, to be also able to give a pager function, to connect a card and a module with a function which is different in each, and to attain multi-functionalization instead of using the PCMCIA socket 50 mentioned above.

[0022] The factice CPU 29 of the personal computer of this example also performs control of interruption control with a system, and the power management of the whole system accompanying this further. A factice CPU 29 transmits and receives the signal concerning SMI, RI, and IRQ, and as mentioned above, between bus controllers 14, he controls the whole system which includes the condition of Maine CPU 11 by this. To coincidence, it connects also with the power controller 23 and a factice CPU 29 controls system power 23a and sub CPU-related system power 23b according to each mode, such as the Fluon mode mentioned later, douse mode, and suspend mode, respectively.

[0023] The functional block diagram of the personal computer 1 of this example is shown in <functional-block> drawing 4 . With the main system 41 which moves by Maine CPU 11, application software, such as a spreadsheet, runs by the maximum upper layer 42, and an operating system (OS) runs by the layer 43 under it. Various kinds of device drivers in the lower layer 44 of this OS move. As a device driver, there are the character recognition engine 45, kana-kanji conversion equipment (FEP) 46, a device driver 47 for pointing, and a device driver 48 for Factices LCD, and there are various kinds of device drivers, such as an object for Maine LCD, an object for FDD, an object for HDD, and an object for printers, further, for example. The character recognition engine 45 is a functional module which performs character recognition with the ink data from the digitizer 22 on the factice LCD inputted by the data from FEP46 being interlocked with. In addition to a kana-kanji conversion, FEP46 performs incorporation of ink data, user-interface management of a character recognition function, etc. Moreover, the device driver 47 for pointing is a functional module for transmitting and receiving the data of relation with the subsystem 61 which runs by the factice CPU 29, especially the relation of a digitizer (touch panel) 22. Furthermore, the device driver 48 for sub LCD is a functional module for transmitting and receiving a factice's LCD 20 display-related data connected to the subsystem 61.

[0024] Thus, the main system 41 is equipped with the device driver which exchanges data between subsystems 61, and when OS or application software moves these device drivers, a subsystem 61 and a factice LCD 20 can be controlled by the personal computer of this example from the main system 41. On the contrary, also from a subsystem 61 side, through a device driver, a main system 41 side can be controlled or data can be sent in.

[0025] A subsystem 61 has the main system interface 63 which is a functional module for communicating the main system 41 and various kinds of data in the maximum upper layer 62. Moreover, the software for [which operates in the environment of a subsystem 61] a communication link runs by this maximum upper layer 62. Furthermore, in this lower layer 64, sub LCD DCM 65, the touch panel input-control module 66, the condition maintenance module 67, the external interface module 68, etc. move. An indicative data is developed to a bit map, it connects with a factice LCD 20 actually in hardware, and sub LCD DCM 65 controls the display of LCD soon. The touch panel input-control module 66 incorporates the electrical-potential-difference data with which resistance division of the touch panel 22 was carried out through the A/D-conversion module 27, and changes into coordinate data the data inputted

from the touch panel 22. A condition maintenance module holds the status for every function which must be held when controlling Maine and the condition of a subsystem, for example, conditions, such as publishing SMI and having become power management mode, and rewrites it if needed. The condition maintenance module equips coincidence with the function which supervises the condition of a cell etc. As for the external interface module 68, reception of RI (ring indicator), measurement of cell data, etc. manage the communication of data performed between an external device and Factice CPU.

[0026] The personal computer of the example of a <operating status of system> book has managed the operating status of Maine CPU 11, Maine LCD 10, and other modules with some modes. The condition of transition between the mode is shown in drawing 5 . A cold start 71 is the case where all systems reboot. Since operation was possible, when the factice LCD 20 and the factice CPU 29 were used for the personal computer 1 of this example, and rebooting for 24 hours and a factice CPU 29 is reset, or after a system fatal error command is published, the case where a system is started corresponds.

[0027] The Fluon mode 72 is in the condition that Maine CPU 11 is operating at full swing, and is the mode which all systems including Maine LCD 10 turn on. This mode is Maine CPU 11, a factice CPU 29, and the mode in which Maine LCD 10 and a factice LCD 20 are moving, and the function of the personal computer of this example can be demonstrated further fully. Many functions can be performed by Maine CPU 11 and the factice CPU 29 at high speed.

[0028] The douse mode 73 is the mode from which the clock of Maine CPU 11 of operation was slowed down to several [1/] using the clock divider function etc. In this mode, it has changed into the slow refresh condition to which the display condition of Maine LCD 10 also lowered the refresh rate to coincidence. While this douse mode 73 reduces power consumption, it is the mode which holds Maine CPU 11 to operating status, and can shift to the Fluon mode 72 quickly.

[0029] Suspend mode 74 is the mode which reduced power consumption further from the douse mode 73. In this mode, although the power source is supplied to Maine CPU 11, the clock of operation is stopped and power is hardly consumed in Maine CPU 11. Furthermore, all the peripheral devices controlled by the peripheral controller 16 are held at an OFF state. Moreover, the power source of Maine LCD 10 is also turned off. Therefore, there is also almost no power consumed with a peripheral device, and power consumption can be lowered sharply. In this mode, since programs, such as OS, are held in the condition of having been loaded, also in case it shifts to the Fluon mode 72, the power consumption of time and effort, such as reboot, and a device required for it can be excluded. However, as compared with the douse mode 73, some time amount is needed for a peripheral environmental check etc., and the time amount to which the display of Maine LCD 10 returns is also needed.

[0030] The high burr NETO mode 75 is the mode in which power consumption is stopped further, and is in the condition which suspended the current supply to a system altogether except for the RTC function of a factice CPU 29 and a peripheral controller. Therefore, in this mode, it is a factice CPU 29 and its system, i.e., the mode in which only processing in which it can be coped with in a factice LCD 20 and touch panel 22 grade can be performed, and will shift to the Fluon mode 72 through the phase which reboots OS.

[0031] The example of the trigger which changes to each mode is as follows. To a cold start 71, it changes by detection of a system reset or a system FETARU error (S1). And after initialization and the system diagnosis of hardware are completed in a cold start, it changes in the Fluon mode 72 (S2). In the Fluon mode 72, if there is no predetermined time amount access, it will change in the douse mode 73 (S3), and on the other hand, if a resume event occurs in the douse mode 73, it will change in the Fluon mode 72 (S4). The case where touch the touch panel 22 on a factice LCD 20, and an input or the reboot of a program is directed in a resume event, the data arrival (a ring, RI) from the pager function connected to the personal

computer, etc. can be considered. It is possible to include not only a pager function but the input from [from other outside] the function, for example, various RF modules, to receive the transmitted data, detection of the external input from the modem connected to the serial port and the arrival of e-mail, etc. in a resume event.
[0032] To suspend mode 74, in the douse mode 73, if there is no further predetermined time amount access, it will change (S5). Moreover, when being set up so that a personal computer may change to suspend mode in power-off, it changes even from the Fluon mode 72 to suspend mode 74 by turning off a power switch (S8). From suspend mode 74, you may change in the Fluon mode 72 by the same above-mentioned resume event, or may change by ON of a power switch (S6).
[0033] To the hibernation mode 75, in suspend mode 74, if there is no further predetermined time amount access, it will change (S7). If it is set up so that a system may change in the hibernation mode 75 by turning on and off of a power switch, if a power switch is turned off in the Fluon mode 72, it will change in the hibernation mode 75 (S10), and if a power switch is turned on in the hibernation mode 75, it will change in the Fluon mode 72 (S9). And since the factice LCD of this example is always displayed, he can also realize a power switch with this factice LCD 20, a touch panel 22, and the softswitch using a factice CPU 29. [a power switch]

[0034] Thus, the personal computer of this example forms the four modes 72-75, and is aiming at reduction of power consumption, and coexistence of expansion of a function by changing these modes. Furthermore, the predetermined function enables it to work in an environment with very little power consumption for 24 hours by forming a factice CPU 29, the factice LCD 20 concerning this, and a touch panel 22. In portable personal computers, such as a notebook mold like this example, when not using Maine LCD, it changes into the condition of having closed, and it changes in suspend mode 74 and the hibernation mode 75. For this reason, in the personal computer of this example, even if it is in the condition which closed Maine LCD, a factice LCD 20 sets in the condition of always seeing, and can continue moving a predetermined function continuously through this factice LCD 20 for 24 hours.
[0035] Of course, it is also possible for it to be original with Maine CPU11 the very thing or each system, and to perform management of the clock of Maine CPU 11 in each mode and management of supply of the power to each system. In the personal computer of this example, the condition of Maine CPU 11 and each system was managed with the signal from the factice CPU 29 who is in operating status for 24 hours, and supply of the power to each system is managed by the power controller 23 connected to the factice CPU 29. For example, when changing from the douse mode 73 to suspend mode 74, the signal which makes SMI publish from a factice CPU 29 is made into delivery, and Maine CPU 11 is made into a idle state at a bus controller 14. On the other hand, when being set up so that it may change in the Fluon mode 72 by arrival-of-the-mail sensing of a pager, a ring instruction (RI) is published to a bus controller 14, and a factice CPU 29 publishes a resume instruction to delivery and Maine CPU 11, and makes the Fluon mode resume.
[0036] In addition, the transition between the modes is not limited above. For example, it is possible to also make the mode change according to the situation of hardware, such as abnormalities in a cell. If the sag of a cell is detected by Factice's CPU A/D-conversion function in the Fluon mode 72, a factice CPU 29 will publish SMI to Maine CPU 11 through a bus controller 14, SMI processing of the system connected with Maine CPU 11 will be performed, and it will shift to suspend mode 74 or the hibernation mode 75. In SMI processing, the system which could suspend the current supply to the system which shifted to system management mode, evacuated the condition and memory of CPU, and was connected with CPU or this by SMI (system management interrupt), and was connected with CPU or this by the resume event etc. can be returned. By preparing such processing, even if abnormalities are in a cell, the

trouble of data losing is avoidable.
[0037] Some examples of use of the touch panel 22 installed in piles by the factice LCD 20 who is the subdisplay prepared in the personal computer of this example, and this factice LCD 20 below in <the example of use which made Factice LCD the input side> are explained. First, the example used as a pointing device to which the cursor displayed on drawing 6 by Maine LCD 10 in the touch panel 22 and a pointer are moved is shown. In this example, if a finger is moved in the direction to move a pointer, pressing a touch panel 22 with a finger, A/D conversion of the signal from a touch panel 22 will be carried out, and it will be inputted as the data to which a pointer is moved, for example, relative movement magnitude, and a direction. Therefore, a user can control a motion of a pointer and cursor by the same feeling as operating pointing devices, such as a trackball, through a touch panel. The area where all a factice's LCD 20 fields could be offered as area from which a pointer etc. is moved, or the factice LCD 20 was restricted is used in order to move a pointer etc., and the remaining area may be used in order to give the same function as the click carbon button of a mouse. The display of the area according to these purposes can be freely set up using a factice LCD 20. Moreover, by operating a pointer etc. using a touch panel 22, even if it does not attach a mouse etc., actuation of the user-friendly OS and application using a pointer can be performed freely.
[0038] Signs that a pen input is performed to application through the touch panel 22 prepared for the factice LCD 20 at drawing 7 are shown. Although there are a case (drawing 7 (a)) which inputs an alphabetic character, and a case (drawing 7 (b)) which inputs an image, each of these can be set up by a factice's LCD 20 display, and a user can perform a pen input using the directed area, and can input data into OS and application which work on Maine LCD 10.
[0039] Each thing shown in drawing 6 and drawing 7 is ****** which is enabling the input of data from the factice LCD 20. Conventionally, the portable word processor which sticks a touch panel on Maine LCD 10, and can perform a pen input is known. On the other hand, in the personal computer of this example, even if it does not prepare a touch panel in the Maine LCD 10 side, a pen input can be performed. Therefore, it can lose inconvenient [on hard to see / by a fall, and the display and input of contrast of Maine LCD by preparing a touch panel being performed together / or actuation]. Moreover, since it is not necessary to establish the area of an input in Maine LCD side, the field which can be displayed can be harnessed in the maximum. Furthermore, since the magnitude of a touch panel can be limited to Factice's LCD magnitude, cost can be reduced and reduction of weight can also be aimed at. Moreover, for becoming possible to adopt a high density touch panel, since a touch panel is small and ends, and performing a pen input, it is convenient.
[0040] The example which uses a factice LCD 20 as an input side is not limited to actuation or the pen input of the above-mentioned pointer. In addition, an input menu is displayed on a factice LCD 20, and the input approach of making input data choose using a touch panel 22 etc. can be considered. Since the field inputted apart from the display of Maine LCD 10 by using a factice LCD 20 is made, the various usage can be considered, an input is still easier and the personal computer which is easy to perform actuation can be realized. It is also one of them to display actuation guidance, and it can output guidance and an error message there is nothing and polite to Factice LCD side with respect to the display of Maine LCD. Thus, the more user-friendly personal computer which can be used easily [anyone] regardless of age or sex is realizable with the personal computer concerning this invention.
[0041] When the input using a touch panel is performed in the Fluon mode 72 from Factice LCD and it is not carried out by an input continuing, it changes in the douse mode 73 and reduction of power consumption can be aimed at. And when a touch panel is pushed again, the Fluon mode 72 can be made to change from the douse mode 73. Transition in the mode using a touch panel is performed as follows, for example. First, input and actuation using a pointer are performed in the Fluon mode 72. Then, if a user cannot touch predetermined time

h g cg b eb cg e e

amount and a touch panel, it changes automatically in the douse mode 73, and will be in a power-saving condition. Next, if a user touches either of the touch panels 22, a factice CPU 29 will operate as a resume event, the clock speed of Maine CPU 11 is revived, and the refresh rate of Maine LCD 10 is also returned to a high speed. In the douse mode 73, the cell display 79 is only given to the factice LCD 20. Of course, it is also possible to perform the display for limiting the field touched in case the mode at the time is displayed on a factice LCD 20 or the mode is changed.

[0042] A display changes with the sag of a cell, for example, when an electrical potential difference is more than constant value, a cell display appears in Factice LCD, and if abnormalities are in the cell of an electrical potential difference falling, as for the cell display 79, a cell display will disappear. When abnormalities occur on a cell, as mentioned above, SMI processing is performed and data and memory are saved.

[0043] The example which assigned the function which displays the message which received from the pager module etc. on a factice LCD 20 to <example of the use which made Factice LCD output side> drawing 8 is shown. For example, in suspend mode 74, Maine CPU 11 is in the stopped condition, and power is not supplied to Maine LCD 10. In this suspend mode 74, sensing of the arrival of data of the pager module 25 or the pager card 51 with which the personal computer was equipped downloads a message using a factice CPU 29. And the message is displayed on a factice LCD 20. Therefore, even if it does not reboot Maine CPU 11 and Maine LCD 10, the data arrival of a pager can be sensed, and a message can be displayed. Similarly, the message which received with the pager also in the hibernation mode 75 can be displayed on a factice LCD 20. It is possible similarly to set the function which displays the signal from the outside through other RF as a factice LCD 20, and processing to the communication link through the telephone line can also be performed using a factice LCD 20.

[0044] Thus, in the personal computer of this example, by forming a factice LCD 20, working continuously for 24 hours can add a desirable function, and the power consumed while the function works can be reduced sharply. Therefore, by adding a pager function etc., the personal computer of this example can always display the information received there by ONTAIMU, and can transmit information with a user.

[0045] Also in the douse mode 73 or the Fluon mode 72, displaying the message from a pager etc. by the factice LCD 20 side has a merit. In the douse mode 73, it is not necessary to return Maine CPU 11 only for the display of a message. On the other hand, the message from a pager can be immediately displayed by the factice LCD 20, without breaking down the display of the application under actuation displayed on Maine LCD 10 also in the Fluon mode 72.

[0046] Of course, it is possible to also make the above and reverse change to the Fluon mode by arrival-of-the-mail sensing of a pager module. If a message is downloaded by the pager module when such a setup is carried out, a factice CPU 29 will send RI to a bus controller 14, and will change in the Fluon mode while he displays the contents on a factice LCD 20. Therefore, if arrival-of-the-mail sensing is carried out in such a setup, Maine CPU 11 will resume operation at full speed with the clock signal of a high frequency, and Maine LCD 10 will resume a display.

[0047] As explained above, the factice LCD 20 who prepared in the personal computer of this example is mainly used for the display for an input, the display of a pager, etc., and, unlike Maine LCD 10, is easy to be the thing of the low resolution of 64x32 or 128x64 grade. Although you may be a color display, of course, even if it is monochrome, the above merits by having ****ed the factice LCD 20 are obtained. Therefore, there are few cost rises by having formed the factice LCD 20. On the contrary, since a touch panel 22 is formed in piles by the factice LCD 20 instead of Maine LCD 10, cost can be reduced, and a body can be made thin. Moreover, since the area to cover is small and ends, it is as having also mentioned above that

the touch panel of high resolution could be installed.
[0048] A factice's LCD 20 magnitude is not limited to this example, and should just be Maine LCD, an EQC, or a small thing. Moreover, a factice LCD 20 is easy to be the thing of a low resolution. Since neither the processing as which Speed is required, nor I/O of a lot of data is performed as the factice CPU 29 who controls such a factice LCD 20, a factice CPU 29 is easy to be a thing (4 bits or about 8 bits). Moreover, the low speed of several MHz or less is enough also as a clock of operation. Therefore, there is very little power consumed as a factice CPU 29, and it ends. Moreover, since it works with a clock of operation by low frequency, there is little effect of the noise from the factice CPU 29 to RF functions, such as a pager unit, and it can ensure arrival-of-the-mail sensing and download of a message with a sufficient precision.
[0049] In addition, although the above example explains arrival-of-the-mail sensing and download of a pager to the example as processing which a factice CPU 29 performs, it is not limited to this. For example, it is also possible to offer services, such as schedule management and a calculator function, continuously independently with Maine CPU using a factice CPU 29 and sub LCD20 grade.
[0050] Moreover, in case a factice LCD 20 operates independently in suspend mode or hibernation mode, the clock frequency of Maine CPU 11 is lowered instead of a factice CPU 29, and you may make it control a factice LCD 20. A factice LCD 20 and a touch panel (digitizer) 22 are connected to ISA Bus 15 through the LCD controller 28 and the input interface 27, respectively, and you may make it control by Maine CPU 11 to be shown in drawing 9 . In such a system, in suspend mode 74 or the hibernation mode 75, Maine CPU 11 does not stop completely, but dividing is further carried out using the clock change device 80 controlled by the bus controller 14 or Maine CPU 11, and the clock signal of a frequency lower than the douse mode 73 is supplied to Maine CPU 11.
[0051] Moreover, although the example by which Factice LCD was beforehand prepared above for the body of a personal computer is explained, it is also possible to **** by attaching PCMCIA card 54 with which Factice LCD was carried as explained based on drawing 1 etc. Furthermore, Factice LCD is easy to be natural, even if it is not limited to one but the object for the display of the message from a pointing device, the object for a pen input, a pager, etc. forms two or more factices LCD.
[0052] Furthermore, in this example, although the portable personal computer of a notebook mold is explained to an example, even if it is information processors, such as a desktop type personal computer and an office computer, in fields, such as a display, alter operation, and power consumption, the same merit as the above is obtained by forming Factice LCD. Moreover, although the liquid crystal display display (LCD) is used for the Maine display and the subdisplay in this example since the personal computer of a notebook mold is made into the example, of course, these displays may be CRT and a plasma display. Furthermore, since the personal computer of a notebook mold was explained to the example, the type whose configuration of a body also opens and closes Maine LCD explains. However, the configuration of a personal computer is not limited to this example, either, and even if it is in the condition which does not use Maine LCD, Factice LCD should just be in the condition that it can always see.
[0053]
[Effect of the Invention] the Maine display whose conventional information processor is equipped with the information processor of this invention as explained above -- in addition, it, the EQC, or the small subdisplay was prepared, and it has proposed processing in at least two modes in the mode in which only the mode in which the Maine display and a subdisplay operate using this information processor, and a subdisplay operate further. Various effectiveness which was mentioned above with the information processor of this new gestalt is acquired. For example, in respect of calling it I/O of data, a touch panel can be used for a

subdisplay as a pointing device in piles, or it can use for a pen input. Since it is not limited to this but the information processor of this invention can use a subdisplay as an object for an input apart from the Maine display, various application software which is much more easy to use for a user can be developed and moved under a different environment from the former. [0054] Moreover, a subdisplay may be used as an output side and the display of time of day or a schedule, the call display of a pager, etc. may be displayed. The function like the Maine display cannot be needed for such application, but such applications can be continuously operated [in / are one of these, and operating continuously for 24 hours is desirable and / the information processor of this invention] using a subdisplay. Since Maine CPU from which the Maine display and this are moved can be stopped while continuing and moving such applications, it becomes the load of a power source is small and possible to prolong the life of a power source sharply. Furthermore, since predetermined application can be continuously moved on a subdisplay in the information processor of this invention, even if it is in the condition which contained the Maine display, it is effective [a subdisplay] to adopt the new configuration where it has always exposed outside.

[Translation done.]